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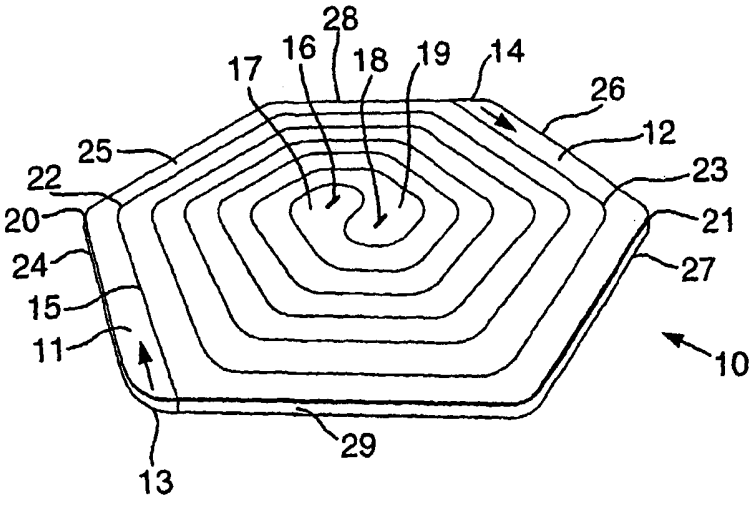
(54) Title: COMBUSTIBLE INSECTICIDAL COIL



(57) Abstract: A combustible pesticidal product (10) is disclosed which comprises a planar continuous helix (11) in the form of a hexagon having sides (24, 25, 26, 27, 28 and 29). An intersection (20, 22) of each side of the structure has a radius of curvature of 5.0 mm to less than 58.5 mm, most preferably 9.0 to 10.0 mm. Typically the combustible product will be a mosquito coil formed from cardboard which has been impregnated with one or more insecticides effective against mosquitoes. On combustion of the coil, insecticide may be emanated into the atmosphere for a period of up to 24 hours. However, typically the coils of the invention will be active against mosquitoes for 12 hours.

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Combustible Insecticidal Coil

Technical Field

This invention relates to combustible products that emanate a pesticide into the atmosphere on combustion and more particularly to such products that undergo combustion for a prolonged period thereby providing an extended time period of pesticidal activity.

Background Art

The kind of products to which this invention relates are commonly referred to as "mosquito coils". Such coils are characterised by being formed from a combustible material which is shaped into a circular helix. Included in the combustible material are one or more pesticides, which in the case of products active against mosquitoes will be insecticides. As the product burns, the insecticides are emanated into the atmosphere by virtue of their volatility. Ideally, such coils will provide an effective level of insecticide in the atmosphere for an appropriate time period.

Typically, mosquito coils are used in environments where persons sleep and are therefore unable to destroy mosquitoes before being bitten. Another usage is environments where infants or others incapable or having a limited ability of destroying attacking mosquitoes are placed.

It will be readily appreciated that mosquitoes are vectors for a number of particularly persistent and often life-threatening or at least debilitating diseases. Most significant among these diseases is malaria. It is therefore highly desirable to prevent mosquito bites as a means of preventing the contracting of such diseases.

Mosquitoes are particularly prevalent in tropical and sub-tropical regions. Many of these regions include countries with relatively low per capita incomes. It is therefore desirable to be able to provide pesticidal products that are highly cost effective. In general terms, traditional mosquito coils fulfil this role. They are relatively easy to form and include low cost ingredients. As emanation of the insecticide is only dependant on combustion of the coil, the only source of energy required is sufficient heat to initially ignite a coil to cause it to combust. However, one feature that is lacking in such coils is the ability to reliably provide a period of sufficient insecticidal activity while a person sleeps overnight. Typically coils should provide up to about 8 hours of insecticidal coverage. However, due to breakage, it is not uncommon for a coil to burn for a significantly shorter period of time. This requires that a person sleeping awake and recognise that the coil is not burning, then carefully relight the unbroken portion

whilst ensuring that it is intact and correctly mounted. Such a requirement is not conducive to maintaining an effective overnight coverage against mosquito bites.

At this point it is worth noting that traditional mosquito coils are formed as planar circular helices in a moulding or other shaping process. At the terminal end of the coil, approximately in the centre, is a small aperture which is used to locate the mosquito coil on an upstanding pin. The upstanding pin usually projects out of a dish or tray which is used to collect the ashes of the combusted coil. Locating of the coil on the pin results in the coil separating out so as to form a continuous spiral with the beginning of the coil, which is where combustion commences, at a point lower than the terminal end which sits on the locating pin. In this way the continuous spiral forms a track which combusts from the outer beginning end to the mounted terminal end.

It should be appreciated that mosquito coils may also be formed as double circular helices. In these structures, the helices are formed co-terminously. However, prior to use, each helix must be separated out. One important reason for producing coils in this way is that of economical use of available material as well as ease of formation in manufacture.

As mentioned above, typically mosquito coils are subject to breakage. This arises out of the fact that they are quite brittle and during manufacture, rather than being produced in a planar form, coils may warp to assume a wavy or convex conformation. In some cases, a free end or tip of the coil may curl upwardly. It is therefore well recognised that breakage may occur during manufacture, packaging, transport and in use by a consumer. In this latter case, it is important that a consumer exercise considerable care in both opening and mounting a coil. More especially in the case of double helical coils, care must be taken in separating out each coil so as to avoid breakage. Again it must be emphasised that any breakage of a coil effectively results in a coil being shortened both in length and most significantly, burn time.

Whilst recognising the short comings of traditional mosquito coils, the present inventors have sought to provide an improved coil which is capable of providing a prolonged effective period of insecticidal coverage and is produced in a manner resulting in a cost effective product relative to the traditional coil.

This has been achieved by recognising that rather than forming a circular helix of combustible material, it is desirable to form a multi-sided helical structure. However, it has been found to be critical that in order to achieve continuous combustion, the intersection of each side must be curved, with a limitation on the radius of the curvature.

Disclosure of Invention

Accordingly, this invention provides in a first aspect a combustible pesticidal product comprising a planar continuous helix which forms a multi-sided structure, an intersection of each side of the structure having a radius of curvature of 5.0 mm to less than 58.5 mm the multi-sided structure including a pesticide which on combustion of the product emanates the pesticide into the atmosphere.

In a second aspect, the present invention provides a method of forming a combustible pesticidal product which on combustion emanates a pesticide into the atmosphere, comprising forming a matrix which includes a pesticide into a planar sheet and cutting the planar sheet in a manner so as to produce one or more planar continuous helices, each helix being a multi-sided structure in which at an intersection of each side of the structure, a radius of curvature 5.0 mm to less than 58.5 mm is formed.

Throughout this specification the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element, integer or step, or group of elements, integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

The combustible pesticidal product may be formed using conventional mosquito coil materials and techniques, although it is preferred that the product is formed from cardboard which is cut into a planar form to the appropriate shape.

Typically using conventional materials and techniques, an insecticide is incorporated into a matrix comprising a combustible fuel material such as sawdust, a binder such as starch and an accelerant or oxygen supply for the fuel such as potassium nitrate. Water is mixed into the matrix and the resultant composition is pressed into a planar sheet which is then cut so as to form the required helical shape. It will of course be appreciated that one or more insecticides or other pesticides may be used in the products of the invention.

In a preferred embodiment, the matrix comprises cardboard which may be a single layer or a plurality of layers or plies up to and including twelve plies. Such cardboard may include insecticide dispersed in the cardboard during manufacture. Alternatively, the insecticide may be applied to the outer surfaces of the cardboard. Application would typically require the insecticide to be dissolved or dispersed in a liquid capable of being applied to the cardboard by a variety of techniques such as spraying and rolling so as to achieve a uniform coating on the cardboard. Conveniently, application would usually be made to one of the planar surfaces of the cardboard although both opposing outer surfaces could be coated if required.

Typically the thickness of the cardboard will be in the range of from 0.75 mm to 3.8 mm. Preferably the thickness will be at least 2 mm, most preferably at least 2.6 mm, especially about 3.0 mm to 3.5 mm.

It is preferred that the cardboard comprises from one to twelve plies, preferably two plies, most preferably three plies. Especially preferred are embodiments which comprise four plies.

The width of the helix will usually be in the range of from 3.0 mm to 10 mm, preferably about 6 mm to 7 mm. It is important that the width is not too great as burning will be suppressed owing to an inadequate level of oxygen. Furthermore, the width should not be too narrow as adequate burn times may not be achievable.

The overall length of a helix is important as it directly effects the burn time. For example, a helix of length 72 cm may burn for 8 hours. By increasing the length of the coil by 50 % to 108 cm, a burn time increase of 50 % to 12 hours would be obtained.

When cardboard is used to form the products of the invention, the density thereof is of importance. To achieve appropriate burn times, it is preferred that the cardboard has a density of 450-850 kgm^{-3}, preferably 600-700 kgm^{-3}, most preferably 650-690 kgm^{-3}.

It will be appreciated that ingredients other then insecticides may usefully be incorporated. These include accelerants such as potassium nitrate, retardants such as potassium carbonate, perfumes and dyes. As with the insecticide, these may be incorporated into the cardboard during manufacture or applied as an external coating once the cardboard has been formed.

The cardboard may be manufactured from a variety of pulp types including recycled pulp, Kraft pulp and thermomechanical pulp. Of these, recycled pulp is preferred as it assists in maximising combustion time of the pesticidal product.

In order to produce the requisite multi-sided structure and helical shape, it is preferred that where cardboard is used to form the product, an appropriately dimensioned knife is used to cut out the structure from the cardboard.

Amongst the multi-sided structures contemplated in this invention, hexagonally shaped structures are preferred. These shapes are advantageous as they allow for the minimisation of the level of waste of cardboard when cut from a planar sheet.

The combustible pesticidal product comprises a planar continuous helix. However, it is within the scope of the invention to provide a single helix or a double helix. A double helix structure is preferred as such a structure has the benefit of providing two, separable combustible pesticidal products. In this embodiment, the helices will interlock over there full length.

In those instances where the combustible pesticidal product is formed from cardboard, cutting of the cardboard may be done in a manner so as to create a product in which each of the helices remain connected by virtue of the cutting incompletely severing the cardboard. An embodiment of this type may be prepared in which a bridge, being a thin section of cardboard, is formed between adjacent portions of a helix. Preferably a bridge is formed at one or more intersections of the sides, most preferably at each intersection. Such embodiments are advantageous as they provide structural support for the product. This allows for the ready packaging and shipment of the product whilst permitting a consumer to easily separate each helix from the other prior to use. In addition, it will be appreciated that a cutting knife to form such embodiments will consist of a number of separate knife segments. Thus if any knife segment is damaged, the damaged segment may be readily replaced. By contrast, when a single cutting knife is used, any damage to the knife requires complete replacement and hence greater cost.

Alternatively, cutting of the cardboard may be done in a manner such that the cardboard is completely severed. In this case, a single knife is used rather than segmented knives as described above. Whilst this has the disadvantage relative to the use of segmented knives in relation to knife damage, nevertheless it is a viable and practical option for the preparation of cardboard coils.

A critical aspect of this invention is the radius of curvature at the intersection of each side of the multi-sided structure. The radius of curvature may 5.0 mm to 58.5 mm. Preferably the radius of curvature is from 8.5 mm to 58.5 mm, most preferably 8.5 mm to 40 mm. Particularly preferred is from 9.0 mm to 10.0 mm.

When produced as mosquito coils, the products of the invention may burn typically for up to 24 hours. By adjusting parameters such as the density, thickness, number of plies and mass of coil, various burn times may be obtained. For example, burn times of at least 4 hours, preferably at least 8 hours, most preferably at least 12 hours may be obtained.

In order to better understand the nature of the invention, a number of examples will now be described with reference to the accompanying drawings.

Brief Description of Drawings

Figure 1 is a perspective view of a first embodiment of the invention;

Figure 2 is a perspective view of a second embodiment of the invention; and

Figure 3 is a perspective view of a third embodiment of the invention.

Modes for Carrying Out the Invention

In figure 1 there is shown a combustible pesticidal product 10 in the form of a regular hexagon having six sides, 24, 25, 26, 27, 28, 29 and comprising double helices 11 and 12. Each of the helices 11, 12 are substantially of the same length and in the planar form shown, interlock over there full length. Each of the helices 11,12 is a mosquito coil.

The helices 11,12 are made from cardboard which has been coated with the requisite insecticide and other materials as required. Each of the helices and the overall shape of the mosquito coils 10 have been produced by using an appropriately dimensioned knife to cut the cardboard. In the case of each of the helices 11,12 the knife cuts have completely severed the cardboard separating each helix, such as at the knife cut shown as 15. This results in mosquito coils in which both of the helices 11,12 remain substantially in place for example during packaging and shipment but which may be readily separated by a consumer prior to the separate use of each helix.

In the case of helix 11, the end at which combustion is commenced is shown as 13. At the distal end 17 of helix 11, there is provided a small slit 16 to facilitate the mounting of the helix 11 on a stand (not shown). The separation of each of the helices 11,12 and the mounting thereof is required prior to use. Thus, in use, combustion of helix 11 occurs in the direction shown by the arrow adjacent 13.

In the case of helix 12, the end at which combustion is commenced is shown as 14. At the distal end 19 of helix 12, there is provided a small slit 18 to facilitate the mounting of the helix 12 on a stand (not shown). Thus, in use, combustion of helix 12 occurs in the direction shown by the arrow adjacent 14.

Sides 24 and 25 of helix 11 meet to form an intersection, an outer edge of which 20 and an inner edge of which 22 both have a radius of curvature of 10 mm. Likewise, sides 26 and 27 of helix 12 meet to form an intersection, an outer edge of which 21 and an inner edge of which 23 both have a radius of curvature of 10 mm. Note that it is within the scope of the invention for the outer edges 20 and 21 not to be curved at all.

In this example, each helix 11, 12 is 6 mm wide, 3.6 mm thick and the overall length is 72 cm. At a cardboard density of 690 kgm^{-3}, the overall mass of each helix is about 15-18 g (excluding coat weight). Such a coil will burn for 8 hours under standard conditions.

In figure 2 there is shown a second embodiment of a combustible pesticidal product 100 in the form of a regular hexagon having sides 103, 104, 105, 111, 112, 113 and comprising a single helix 101. The helix is a mosquito coil.

The mosquito coil 100 is made from cardboard which has been coated with the requisite insecticide and other materials as required.

The helix 101 and the overall shape of the mosquito coils 100 has been produced by using an appropriately dimensioned knife to cut the cardboard. This may be achieved in the same manner as described in relation to the first embodiment but in this embodiment, the knife cuts in addition to completely severing the cardboard to produce the mosquito coil 100 also allow for the ready removal of the cardboard from the space shown as 110. Such cardboard when removed may also form a mosquito coil or may be discarded or recycled.

In this embodiment combustion is commenced at end 102. At the distal end 107 , there is provided a small slit 106 to facilitate the mounting of the helix 101 on a stand (not shown). Thus, in use, combustion of helix 101 occurs in the direction shown by the arrow adjacent 102.

Sides 103 and 104 meet to form an intersection, an outer edge of which 108 and an inner edge of which 109 both have a radius of curvature of 10 mm. Note that it is within the scope of this invention for the inner edge 109 to have a 10 mm radius of curvature whilst the outer edge 108 is not curved at all.

In this example, helix 101 is 6 mm wide, 3.6 mm thick and the overall length is 72 cm. At a cardboard density of 690 kgm^{-3} , the overall mass of each helix is about 15-18 g (excluding coat weight). Such a coil will burn for 8 hours under standard conditions.

In figure 3 there is shown a third embodiment of a combustible pesticidal product 200 in the form of a regular hexagon having sides 207, 208, 211, 212, 213, 214 and comprising a single helix 201. The helix is a mosquito coil.

The mosquito coil 200 is made from cardboard which has been coated with the requisite insecticide and other materials as required.

The helix 201 and the overall shape of the mosquito coil 200 have been produced by using an appropriately dimensioned knife to cut the cardboard. This may be achieved in the same manner as described in relation to the first embodiment in that the respective sides of the coil are severed from each other. For example, a knife cut at 209 is sufficient to sever sides 208 and 210 from each other. In use a consumer may readily separate each of the sides from each other so as to present a continuous intact helical coil.

In this embodiment combustion is commenced at end 202. At the distal end 204 , there is provided a small slit 203 to facilitate the mounting of the helix 201 on a stand (not shown). Thus, in use, combustion of helix 201 occurs in the direction shown by the arrow adjacent 202.

Sides 207 and 208 meet to form an intersection, an outer edge of which 205 and an inner edge of which 206 both have a radius of curvature of 10 mm. Note that it is within the scope of this invention for the inner edge 206 to have a 10 mm radius of curvature whilst the outer edge 205 is not curved at all.

In this example, helix 201 is 6 mm wide, 3.6 mm thick and the overall length is 72 cm. At a cardboard density of 690 kgm^{-3}, the overall mass of each helix is about 15-18 g (excluding coat weight). Such a coil will burn for 8 hours under standard conditions.

It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

CLAIMS:

1. A combustible pesticidal product comprising a planar continuous helix which forms a multi-sided structure, an intersection of each side of the structure having a radius of curvature of 5.0 mm to less than 58.5 mm the multi-sided structure including a pesticide which on combustion of the product emanates the pesticide into the atmosphere.

2. A combustible pesticidal product as claimed in claim 1 in which the radius of curvature is from 8.5 mm to 58.5.

3. A combustible pesticidal product as claimed in claim 2 in which the radius of curvature is from 8.5 to 45.0 mm.

4. A combustible pesticidal product as claimed in claim 3 in which the radius of curvature is from 9.0 mm to 10.0 mm.

5. A combustible pesticidal product as claimed in any one of claims 1 to 4 wherein the multi-sided structure is a hexagon.

6. A combustible pesticidal product as in any one of claims 1 to 5 wherein the radius of curvature occurs on an inner edge of each side.

7. A combustible pesticidal product as in any one of claims 1 to 4 wherein the product is formed from cardboard comprising from 1 to 12 plies.

8. A combustible pesticidal product as in claim 7 wherein the cardboard is comprised of 2 or more plies.

9. A combustible pesticidal product as in claim 8 wherein the cardboard is comprised of 3 plies.

10. A combustible pesticidal product as in claim 8 wherein the cardboard is comprised of 4 plies.

11. A combustible pesticidal product as in any one of claims 7 to 10 wherein the thickness of the cardboard is from 0.75 mm to 3.8 mm.

12. A combustible pesticidal product as in claim 11 wherein the thickness of the cardboard is at least 2 mm or more.

13. A combustible pesticidal product as in claim 12 wherein the thickness of the cardboard is at least 2.6 mm or more.

14. A combustible pesticidal product as in claim 13 wherein the thickness of the cardboard is about 3.0 mm to 3.5 mm.

15. A combustible pesticidal product as in any one of claims 7 to 14 wherein the density of the cardboard is from 450 kgm^{-3} to 850 kgm^{-3}.

16. A combustible pesticidal product as in claim 15 wherein the density of the cardboard is from 600 kgm^{-3} to 700 kgm^{-3}.

17. A combustible pesticidal product as in claim 16 wherein the density of the cardboard is from 650 kgm^{-3} to 690 kgm^{-3}.

18. A combustible pesticidal product as in any one of claims 7 to 17 wherein a bridge forms a connection between adjacent sides.

19. A combustible pesticidal product as in claim 18 wherein the bridge is at one or more intersections, preferably all intersections.

20. A combustible pesticidal product as in any one of claims 7 to 17 in which the cardboard is completely severed between adjacent sides.

21. A combustible pesticidal product as in any one of claims 1 to 20 wherein an inner edge of the intersection of each side has the radius of curvature and an outer edge of the intersection of each side has no radius of curvature.

22. A combustible pesticidal product as in any one of claims 1 to 21 wherein the product is a mosquito coil having a burn time of at least 4 hours up to 24 hours. preferably at least 8 hours, most preferably at least 12 hours.

23. A combustible pesticidal product as in claim 22 wherein the mosquito coil has a burn time of at least 8 hours.

24. A combustible pesticidal product as in claim 23 wherein the mosquito coil has a burn time of at least 12 hours.

25. A mosquito coil as hereinbefore defined with reference to any one of the figures 1, 2 or 3.

26. A method of forming a combustible pesticidal product which on combustion emanates a pesticide into the atmosphere, comprising forming a matrix which includes a pesticide into a planar sheet and cutting the planar sheet in a manner so as to produce one or more planar continuous helices, each helix being a multi-sided structure in which at an intersection of each side of the structure, a radius of curvature 5.0 mm to less than 58.5 mm is formed.

27. A method of forming a combustible pesticidal product which on combustion emanates a pesticide into the atmosphere, comprising forming a matrix into a planar sheet, cutting the planar sheet in a manner so as to produce one or more planar continuous helices, each helix being a multi-sided structure in which at an intersection of each side of the structure, a radius of curvature 5.0 mm to less than 58.5 mm is formed and applying a pesticide to the planar sheet before cutting, after cutting or both before and after cutting.

28. A method of forming a combustible pesticidal product as in claim 27 or claim 28 wherein the planar sheet is cut in a manner such that the radius of curvature is from 8.5 mm to 58.5 mm, preferably 8.5 mm to 45.0 mm, most preferably 9.0 mm to 10.0 mm.

29. A method of forming a combustible pesticidal product as in any one of claims 2 to 28 wherein the planar sheet is cardboard.

Fig.1.

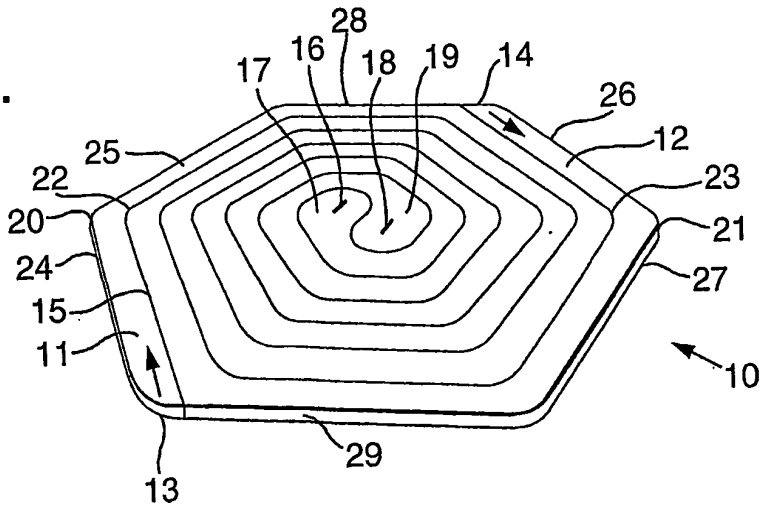


Fig.2.

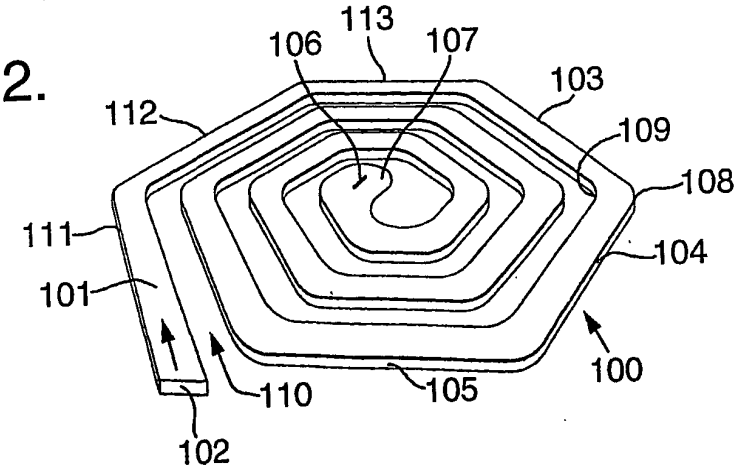
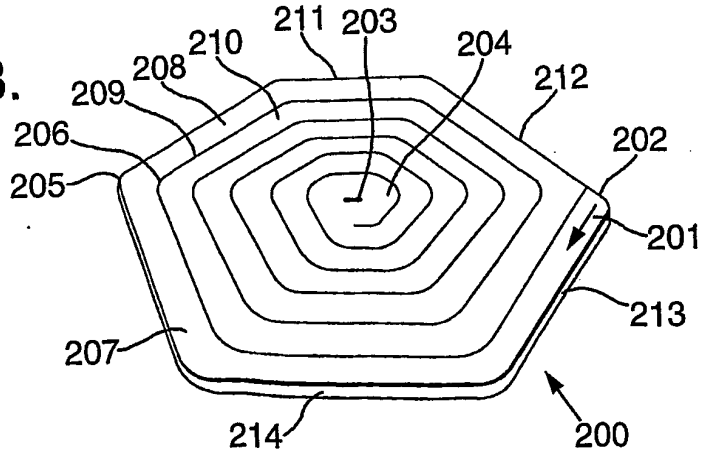


Fig.3.



INTERNATIONAL SEARCH REPORT

International Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A01N25/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A01N A01M A61L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
WPI Data, EPO-Internal, CHEM ABS Data, CAB Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 04, 31 March 1998 (1998-03-31) & JP 09 328403 A (HIRAI MASAKAZU), 22 December 1997 (1997-12-22) abstract	1-4,6, 21,26-28
Y		1,7, 11-14, 18,19,29
Y	FR 2 705 530 A (GAMAURY JEAN FRANCOIS) 2 December 1994 (1994-12-02) page 2, line 6 -page 4, line 17	1,7, 11-14,29
Y	AU 429 675 B (HIKOHISA UEYAMA) 25 October 1972 (1972-10-25) page 2, paragraph 5 -page 3, paragraph 1	1,18,19

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

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Date of the actual completion of the international search	Date of mailing of the international search report
19 December 2001	03/01/2002

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 01/03413

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 01 00105 A (RAMAN AROON ;KUMAR SATHEESH (IN); MANJUNATHA S (IN); NATESH G K (I) 4 January 2001 (2001-01-04) page 6, paragraph 2 - paragraph 3 page 8, paragraph 1 ---	1-4,6,7, 11-17, 21,26-29
A	US 5 447 713 A (ELSNER THOMAS ET AL) 5 September 1995 (1995-09-05) column 1, line 37 - line 43 column 2, line 27 - line 32 ---	1-29
A	GB 2 262 231 A (CHOU HOWARD ;YAP MIN CHEONG (MY)) 16 June 1993 (1993-06-16) figures 1,5 -----	1-29

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB 01/03413

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
JP 09328403	A	22-12-1997	NONE		
FR 2705530	A	02-12-1994	FR	2705530 A3	02-12-1994
AU 429675	B	25-10-1972	AU	6160969 A	01-04-1971
WO 0100105	A	04-01-2001	AU	5558500 A	31-01-2001
			WO	0100105 A2	04-01-2001
US 5447713	A	05-09-1995	DE	4209921 A1	30-09-1993
			BR	9301329 A	05-10-1993
			CN	1076828 A	06-10-1993
			IT	MI930516 A1	27-09-1993
			JP	6116105 A	26-04-1994
			MX	9301403 A1	01-09-1993
			ZA	9302158 A	23-11-1993
GB 2262231	A	16-06-1993	CN	1073069 A	16-06-1993
			JP	5271003 A	19-10-1993